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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/646,892	08/25/2003	Hitoshi Maeda	241862US3	1240
22850	7590	07/28/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			ROGERS, DAVID A	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 07/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/646,892

Applicant(s)

MAEDA, HITOSHI

Examiner

David A. Rogers

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 1-4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20030825</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Please note that the USPTO has a new centralized fax number for communications. **The new centralized fax number is 571-273-8300.** The old centralized fax number (703-872-9306) will be discontinued on 15 September 2005.

Election/Restrictions

2. Applicant's election with traverse of Invention I in the reply filed on 29 June 2005 is acknowledged. In view of the prior art the restriction is hereby withdrawn. Claims 3 and 4 are rejoined.

Specification

3. The disclosure is objected to because of the following informalities.

a. The applicant uses the term "capacity" and the phrase "scanning capacity microscope" throughout the specification, including the abstract. The term should be changed to --capacitance-- and the phrase should be changed to --scanning capacitance microscope-- since these are better terms of art.

b. The applicant uses the term "shape" throughout the specification, the abstract, and the claims. The term should be changed to --tip-- since this is a better term of art.

c. Make the following changes to the specification beginning on page 1, line 11 in order to improve readability:

Conventionally, a scanning capacitance ~~capacity~~-microscope (mentioned as SCM hereinafter) is employed as a device to detect a distribution of an electrostatic capacitance ~~capacity~~ on a surface of a sample by making a probe part approach and scan the surface of the sample and measuring the electrostatic capacitance

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~~capacity~~ formed between electric charges of the probe part and the surface of the sample. ~~See (for example, refer to FIG. 2 of Japanese Laid-Open Patent Application Laid-Open No. 8-136555 (1996)).~~

With regard to measurement by an ~~the~~ SCM, a conductive cantilever is employed, ~~and~~ For ~~for example,~~ a cantilever in which ~~that~~ conductors such as Pt, CoCr and so on coat an entire surface of a non-doped silicon chip is employed.

However, with regard to ~~the~~ SCM, measurement is performed employing an electric force which is influenced over a long distance as compared with an atomic force. Thus the ~~thus a~~ surface resolution capacitance ~~capacity~~ of ~~the~~ ~~that~~ SCM is influenced not only by a microscopic shape at an extreme edge of the probe part set to the cantilever, but also by a macroscopic shape near the edge of that probe part.

Here, the surface resolution capability is an indication showing the a performance of a microscope ~~and so on and~~ the a-value indicating a capacitance ~~capacity~~ limit that an identification and a detection are possible while separating different two points in a space.

Then, in a standpoint of the electric force which is a long-distance force (that is to say, in a macroscopic standpoint), it is suggested that only one surface of a triangular pyramidal tip of an SCM be coated with a conductor ~~the probe part that of it having a triangular pyramid shape is coated with the conductor is applied to the probe part of the cantilever of the SCM to control an influence of a part which does not relate to a direct observation of the probe part of the cantilever. See (for example, "Lecture Manuscripts of 49th Applied Physics Relation Joint Lecture Meeting", March 2002, Shonan School Building in Tokai University, pp. 687).~~

When ~~However, in case that~~ the coating of the conductor is performed on only one surface of the triangular pyramidal tip probe part ~~having the triangular pyramid shape set to the cantilever of the SCM~~, the surface resolution capability is improved as compared with a case that the coating of the conductor is performed on the entire surface of the triangular pyramid. ~~However, there is a limitation in the improvement of that surface resolution capability.~~

d. Make the following changes to the specification beginning on page 2, line 17 in order to improve readability:

It is an object of the present invention to provide a cantilever which enables a further improvement of a surface resolution capability of microscopes such as a SCM ~~and so on~~ and a manufacturing method thereof.

The present invention relates to a cantilever which has a probe part scanning an observed sample and an electrode part supporting the probe part. According to the present invention, the probe part constituting the cantilever includes an insulator and a conductive wiring. The insulator has a sharp-pointed solid tip shape. The conductive wiring is placed on a part of a side surface of the

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insulator. ~~One~~ One ~~one~~ edge of it reaches the ~~a~~ peak of the solid tip ~~shape~~ and the ~~an~~ opposite edge of it reaches the electrode part.

For example, by applying that cantilever to the microscopes such as the SCM ~~and so on~~, an area that the conductor except for an extreme edge part of the probe part relating to a direct measurement faces with the observed sample becomes small, and an influence of the conductor of a part which does not relate to the measurement directly can be controlled. Accordingly, corresponding to that control, a surface resolution capability of the SCM can also be made to improve.

According to the present invention, a manufacturing method of a cantilever includes steps (a) through (f), ~~(b), (c), (d), (e) and (f)~~. The step (a) is a step of forming a hole having a sharp-pointed solid shape in a surface of a substrate so that a peak is formed inside of that substrate. The step (b) is a step of forming a sacrifice film to cover the surface of the substrate and a side surface of the hole having the solid shape. The step (c) is a step of forming a conductive wiring in the side surface part of the hole having the solid shape on the sacrifice film so that one edge of it reaches a peak of the hole having the solid shape. The step (d) is a step of embedding an insulator having a selective etching rate to the sacrifice film to fill up the hole having the solid shape after the step (c). The step (e) is a step of forming an electrode part to cover an upper surface of the insulator, an opposite edge of the conductive wiring and the sacrifice film. The step (f) is a step of separating the insulator, the conductive wiring and the electrode part from the substrate by etching the sacrifice film after the step (e).

e. The specification refers to layer 18 as a film. Change the term "film" to either --cantilever-- or --beam-- to be consistent with the terms used in the art.

Appropriate correction is required.

Information Disclosure Statement

4. The applicant cites "Lecture Manuscripts of 49th Applied Physics Relation Joint Lecture Meeting" on page 2 of the specification. It is requested that the applicant provide a copy of this citation along with an appropriate translation in response to this action.

Claim Objections

5. Claims 1-4 are objected to because of the following informality. The applicant uses the term "shape" throughout the claims. The term should be changed to --tip-- since this is the better term of art. Appropriate correction is required.

Allowable Subject Matter

6. Claims 1-4 are allowed subject to the objections noted above.
7. The following is an examiner's statement of reasons for allowance.

The prior art teaches several types of measuring devices including atomic force microscopes, scanning probe microscopes, scanning capacitance microscopes, etc.

The applicant distinguishes "wiring" from "coatings" in their specification. See, for example, the applicant's reference to the prior art where coatings are provided on an entire surface of the tip. See also the specification where the applicant states that their wiring that offers improved surface resolution, and cites an example where the wiring is about 20 nm wide and does not "coat" the entire surface of the tip.

The reference "Scanning Capacitance Microscopy" to Matey *et al.* teaches a stylus with an electrode as shown in figure 2. Matey *et al.* teaches that the electrode reaches to within 20 nm from the bottom of the stylus. Matey *et al.* does not suggest an electrode that reaches the bottom of the stylus.

United States Patent 5,461,907 to Tench *et al.* teaches a cantilever as shown in figure 2A. The cantilever comprises an insulator tip (reference item 13') with a gold coating (reference item 18). Tench *et al.* does not teach or suggest a conductive wiring.

United States Patent 5,166,520 to Prater *et al.* teaches a cantilever comprising a central hole in an insulator tip (reference item 12). This hole is filled with conductive material (reference item 20) that is coupled to an electrode part (reference item 22). Prater *et al.* also does not teach or suggest a wiring on a solid tip that leads to the electrode.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (571) 272-2205. The examiner can normally be reached on Monday - Friday (0730 - 1600).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is **571-273-8300**.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dar 

13 July 2005


HEZRON WILLIAMS
SUPERVISORY PATENT EXAMINER
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